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Volttron for Small and Medium Buildings

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Agenda

- A private sector view on Volttron
- Why do we continue to invest
- What's changed in a year
- What's stayed the same
- What's needed for the future
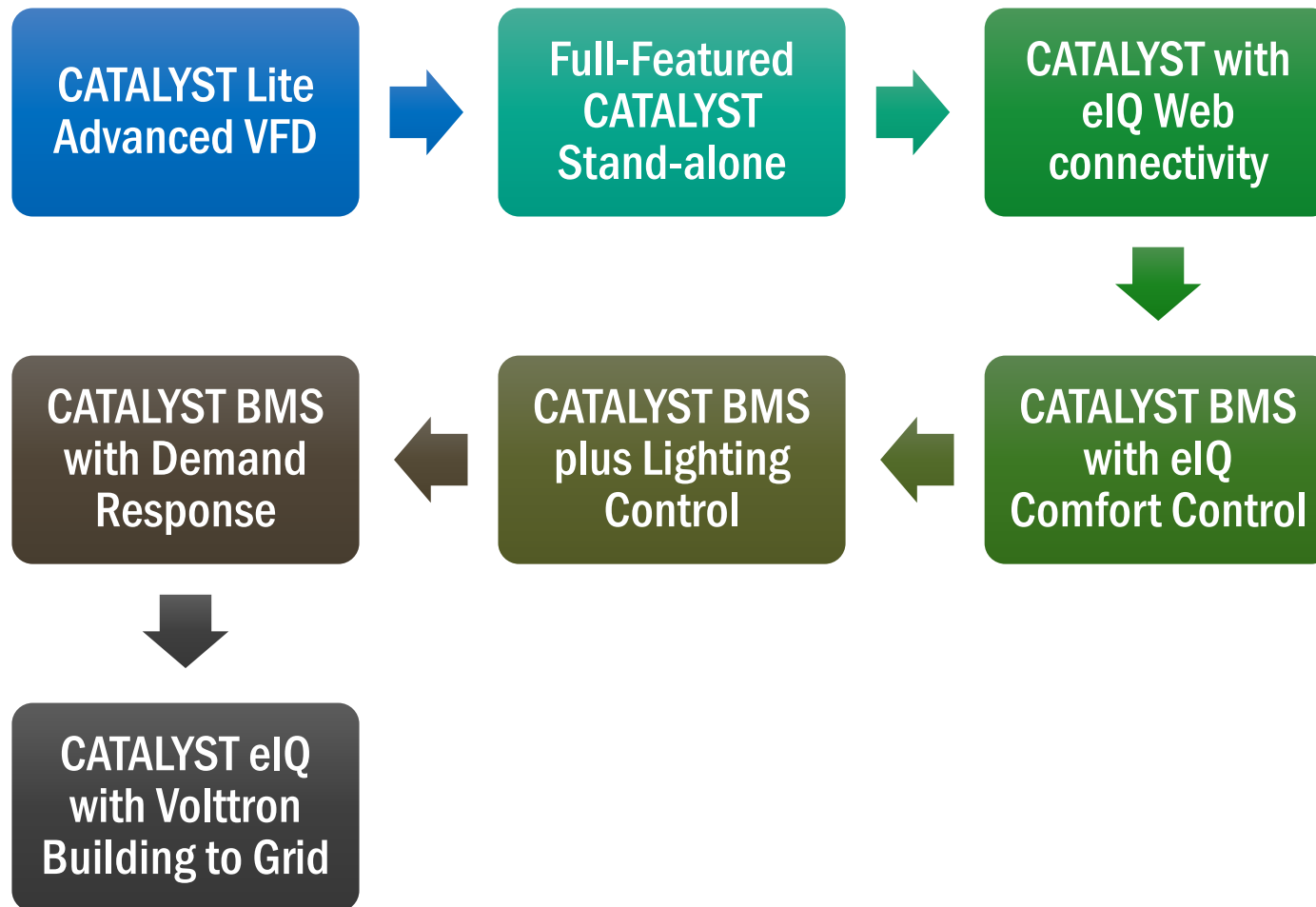
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About Transformative Wave

- A subsidiary of the Performance Mechanical Group
  - 30 year + design build mechanical contractor
  - 80 + total employees

- Founded in 2009 as the technology development

- Primary product, THE CATALYST, is a retrofit kit for packaged RTU's that reduces their energy consumption by 25-50%

- We have a unique view
  - Sell to small local customers
  - Sell to other mechanical contractors
  - Sell to large national retailers

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About Transformative Wave

Solution Stack

CATALYST Lite Advanced VFD → Full-Featured CATALYST Stand-alone → CATALYST with eIQ Web connectivity → CATALYST BMS with eIQ Comfort Control → CATALYST BMS plus Lighting Control → CATALYST BMS with Demand Response → CATALYST eIQ with Volttron Building to Grid
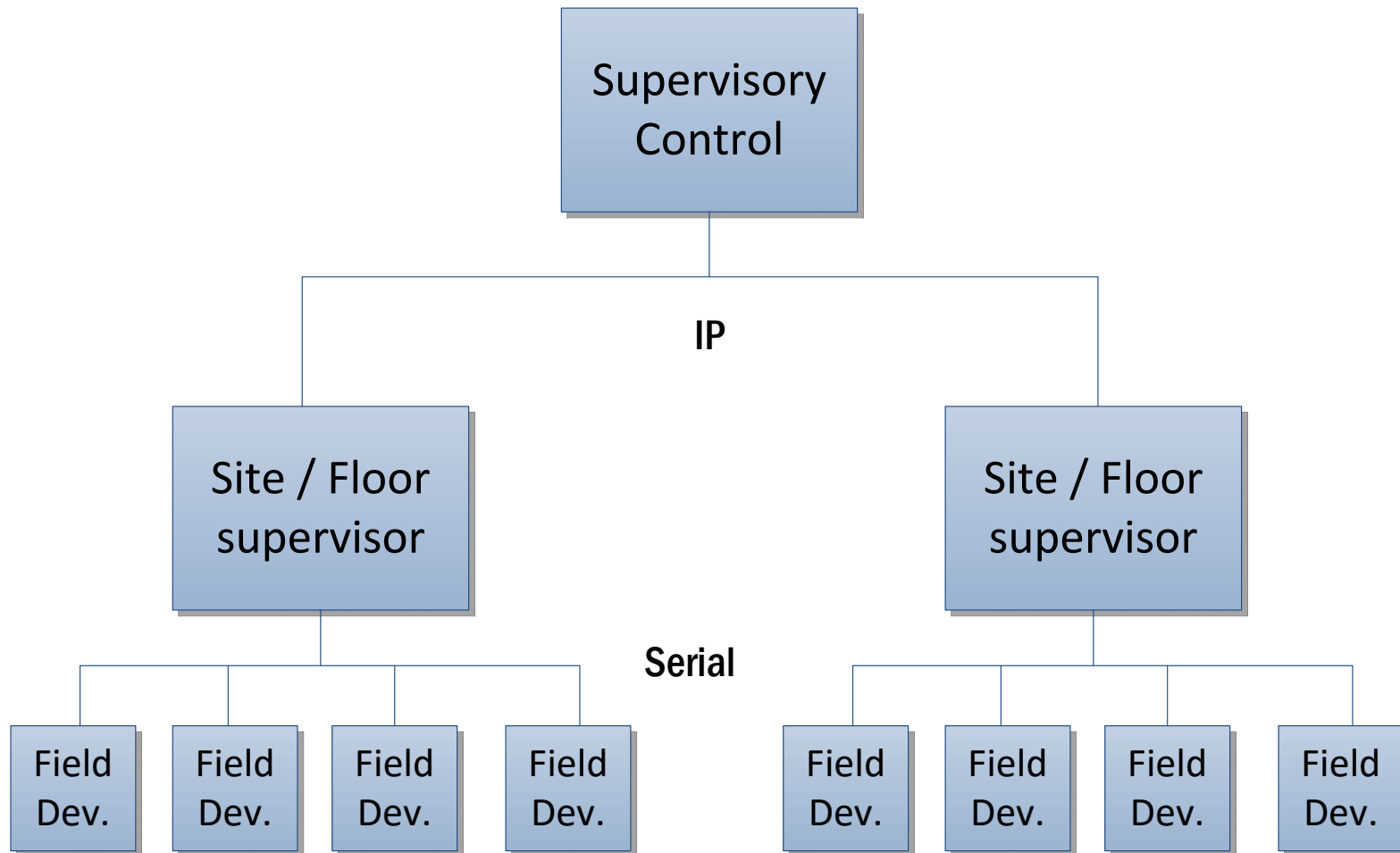
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Why we invest in Volttron

- Our long term vision expects a major change in BMS architecture
  - Shift from serial technologies to IP based technologies
  - Shift from traditional protocols (BACnet, Modbus) to API's

- IOT Influence is affecting customers expectations
  - Connecting more devices at a lower cost
  - Customers expect everything to be available via the web
  - Using information to augment a person's daily activities

- We believe in Open Source, Open Communities, and Customer Choice
  - We believe that we'll earn the business
  - It can kick start development
  - Leverage community to get products to market faster
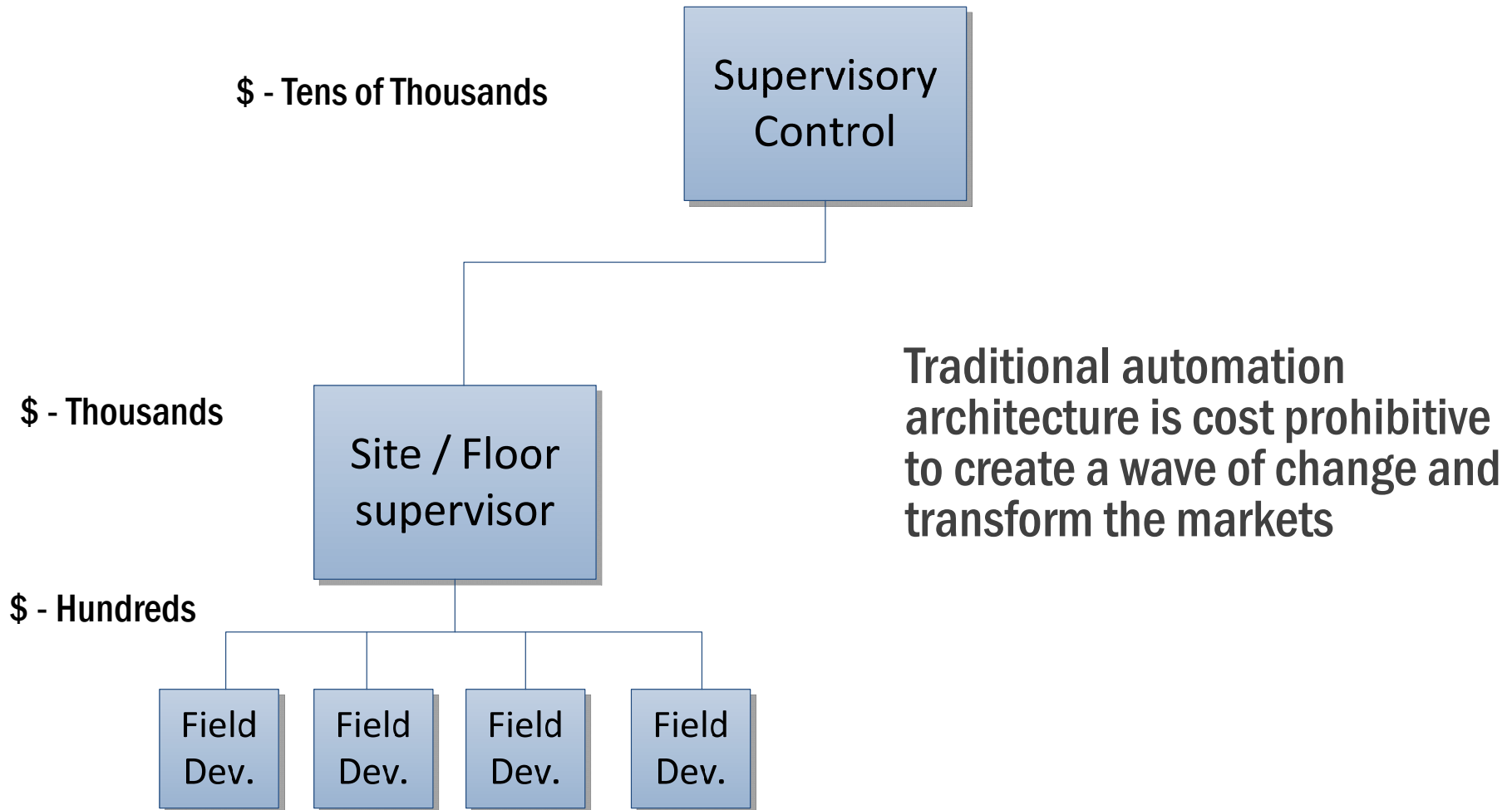 - The best ideas aren't always in house

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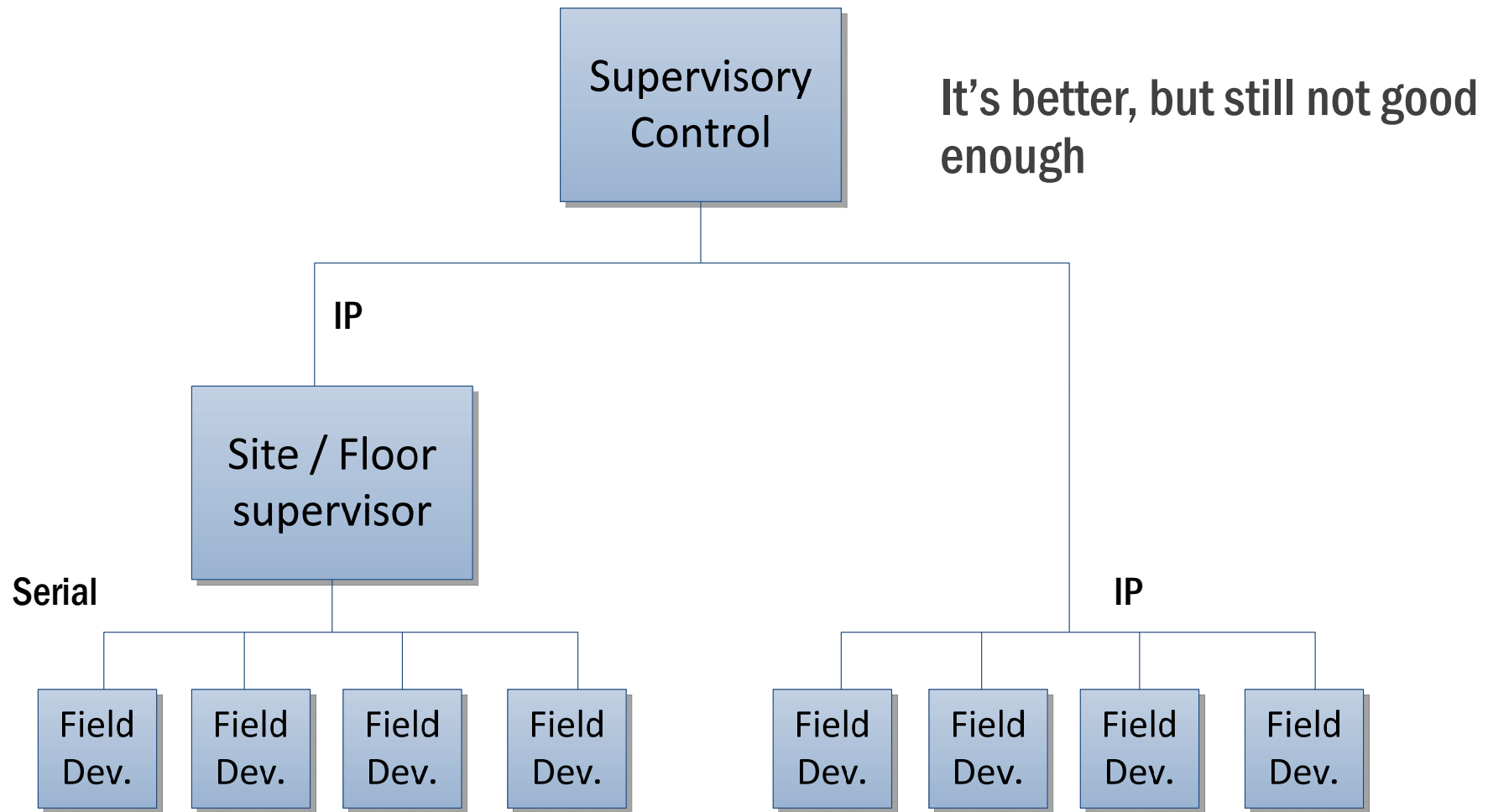
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Traditional BMS Architecture

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Traditional BMS Architecture

$ - Tens of Thousands

Supervisory Control

$ - Thousands

Site / Floor supervisor

$ - Hundreds

Field Dev. **Field Dev.** **Field Dev.** **Field Dev.**

Traditional automation architecture is cost prohibitive to create a wave of change and transform the markets

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Modified BMS Architecture

Supervisory Control

It's better, but still not good enough

IP

Site / Floor supervisor

Serial

IP

Field Dev.

Field Dev.

Field Dev.

Field Dev.

Field Dev.

Field Dev.

Field Dev.

Field Dev.

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Why do we invest in Volttron

- Commercial Industry is always pursuing a 2-3 year payback
    - Current approx. cost to deploy small site $5,000
    - @ $0.10 kWh - Need to save 16,000 - 25,000 annual kWh
    - Current solution saves about 12,000 kWh
    - Two things need to happen savings increase or cost decrease

- Impact of Volttron
    - Push critical intelligence back out to the field
    - Reduced cost of deployment
    - Leverage agents for additional energy savings
    - Key in achieving a solution for the small and medium buildings

What's Changed in a Year

Hardware Platform

- Last year – Early release at this time

- We're in full production

- Not designed to be a large building supervisor

- Designed for 10 units and less

- Designed to be installed at the unit

- Specs
  - TI ARM Cortex-A8
  - 1GHz CPU
  - 512MB DDR3
  - 4GB Solid State Drive
  - Expandable SD Card Memory
  - Single band 2.4GHz 802.11 b/g/n Wi-Fi
  - 10/100 802.3 Wired Ethernet
  - 2 Serial Ports

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What's Changed in a year
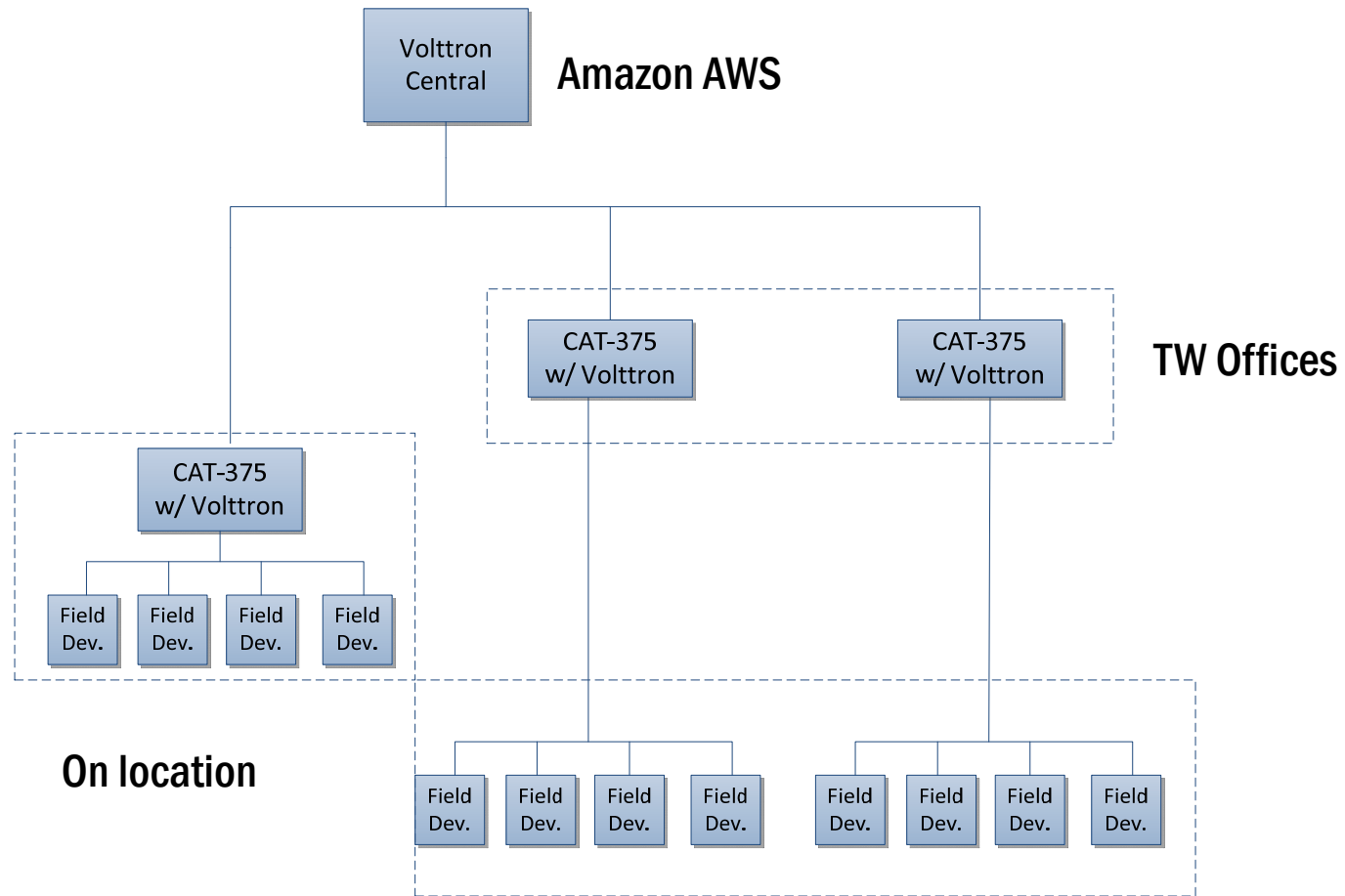
Field deployments

- 14 field deployments
  - 2 in field
  - 12 in office
  - 1 Volttron Central at AWS
  - Reprogram field controllers for BACnet or Modbus IP

- Time to deploy
  - From days to hours
  - Scripting, standards, and configs

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What's Changed in a Year

## Field Deployments

What's Stayed the Same

Volttron has a high learning curve

- Not the case for everyone, but true for mechanical contractors

- Used to commercial off-the-shelf software

- Nothing ready made about Volttron

- Requires a shift, new focus areas, and new skills

- Trouble finding software developers with mechanical skills

- Lengthens the development process (Hope this will change)

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What's stayed the same

End goal – Small and Medium Buildings

- Volttron can help close the cost gap
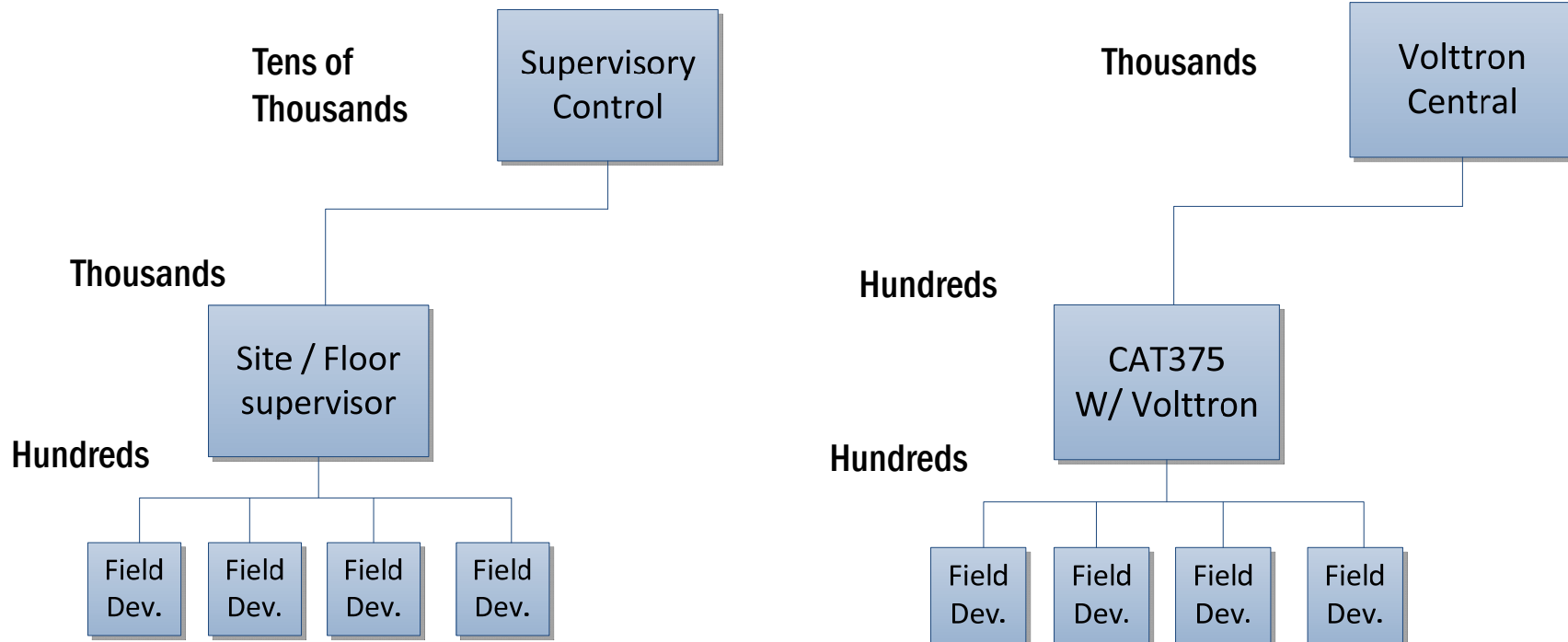
What's stayed the same

End goal – Small and Medium Buildings

- Volttron can provide additional savings on top of our current solution

- Volttron based services (VBS)
  - Air Side Fault Detection
  - Baselining, Measurement & Verification
  - Demand Response
  - RTU Coordination
  - Tenant Billing Services

- Testing right now to prove the savings from other measures

VBS

CATALYST

Savings Goal

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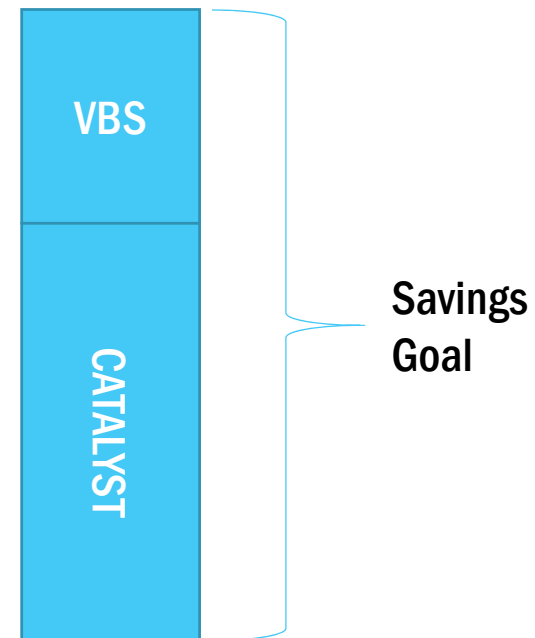
What's Needed in the Future

Future Needs of Volttron

- Standardization for points and equipment
  - Makes agents easier to use

- Better deployment guides for lab developed agents

- Training program / certification

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Thank You

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